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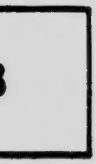

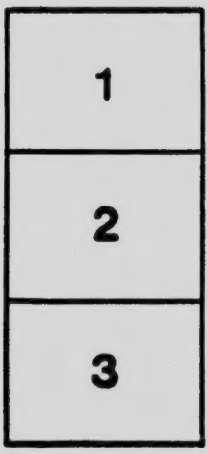


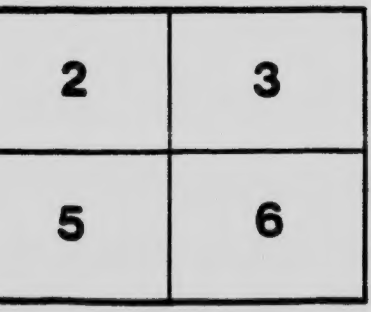

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# AN HOUR IN A CANADIAN SUGAR FACTOY

By EDWARD MOORE

"But, Carol," Dorothy said, with a peculiar but characteristic pucker in her forehead, "we learned at school just the other day that sugar cane comes from Cuba and the Southern States. And yet you tell us you saw sugar being made from material grown right around the factory. That doesn't seem to jibe to me."

Carol Webster, a Winnipeg girl, had been on a month's trip east with her father and mother, and when some of friends were giving her a hearty back one of them had ded a question: "What was most interesting thing you saw all e time you were away?"

In answering this Carol thought for a moment, smiled, and then said: "That's a pretty hard one, girls, for I surely had a good time and saw a lot of splendid things. But the most interesting, I think, was the afternoon I spent in the sugar factory at Chatham seeing how they make sugar. I was proud, too, to learn that it was an all-Canadian product."

Now Carol proceeded to answer Dorothy's question."

"Oh, but this wasn't cane sugar," she said eagerly. "Didn't you know they make it from beets—sugar beets —just the same, so much so that I don't believe one of you could tell the difference no matter how you tested it. Probably you've used a good deal of the Canadian product, too. Our grocers here sell it all the time. But people don't seem to realize that they are getting a wholly home-made product.

Urged to tell something about it. Carol went on in her own way. Probably you would like to hear more of her story

"It was this way," she began. "Uncle Jasper knew Mr. Kent, the manager of the big new factory, so he arranged for Cousin Beatrice and I to run down one afternoon."

"When we got near the factory," the story went on, "we saw piles of beets, tons and tons of them, some brought in by the farmers in their wagons from the districts near the factory, some dumped off flat cars on the railway and down at the dock a big shovel-dredge was grabbing up huge buckets of them from barges which come down the river."

As she saw the interest deepen in the girls' eyes Carol began to get interested herself, and the story came a little more rapidly than before.

"If we could only wash dishes like they wash those beets," she said. "Why, they are carried into the factory in water flumes. That takes off part of the dirt. Next they are put in another washing machine.—Mr. Kent caled it a beet wheel—which picked up the beets in buckets fastened

**Sugar Beets Arriving at the Factory Direct from the Farms**

around the rim and lifted them for a final washing into the beet washer. Here a lot of wooden paddles kept the beets in motion, and since the water was always being renewed, if carried the dirt away with it. Even yet an occasional weed or leaf sticks to the beets, and to get rid of these they run them all over a long series of wooden rollers which takes out everything like this they don't want.

"From here," Carol went on, "I wondered what was coming for Mr. Kent took us away up to the top of the refinery. Here the beets were automatically weighed and then started on their wonderful journey through the various processes which made them into sugar.

"From the weighing machine the raw product passes down through chutes in big tank-like machines—the beet-slicers—which gouge out V-shaped slices. What was it they called them? Oh, yes, 'Cosettes.'

"Next we saw where the cosettes were led down through a series of chutes to a floor below. When we walked into this room,"—Carol stopped here for a moment and smiled—"I wondered what I was getting into It was a long, well-lighted, beautifully clean room with an aisle down the middle and on each side row after row of the funniest-looking machines—you'd have to see a picture, for I can't describe them—which were called 'diffusion cells.' It made me think of brother Bob in the artillery when Mr. Kent explained that each row was called a "battery," and each "battery" was made up of twelve cells. I'd read about how they crushed up the sugar cane and expected to see the beets all crushed and pressed. But the sugar comes from them in another way. First they load up those diffusion cells with what might be called a charge of cosettes. And it's done in the handiest way. Why, a rubber belt conveyor carries along a supply of the cosettes received from the chutes and automaticaly the right amount is placed in each cell. Then the cover of each is closed down tight and warm water is run in from a series of piping. This water goes on like, oh—" Carol hesitated a moment as if perplexed to find the proper simile, and then, fairly hurled out, "Why, just like we do in progressive games, going from the bottom table to the top. As it goes on from cell to cell it gathers from each cell a certain amount of a sort of sugar extract from the cosettes, getting stronger you see, each time. The water goes through heaters, too, while it passes along through the cells till at the end of the battery the watery product, now really a juice is very hot and rich with the sugar extract."

"Seems to me," Betty Thomas interrupted just here, "that those machines work a good deal like a bee gathering honey. How do they unload it?"

Carol laughed with the rest—"It does seem a little like that," she said. "As to the unloading—the juice is led on into a measuring tank, and then on to another process."

"And do they keep on using the beet slices again and again?" another of the girls asked.

**One of the Beet Slicers**

"Oh, no! I should have told you about that. After the water has done its work the cosettes are taken out of the diffusion cells and carried out to a separate plant where the pulp is dried out, pressed and packed in bags. Mr. Kent told us it made an excellent cattle food. So you see there is nothing wasted in the process.

"It was a puzzle to me at first," Carol went on again after a moment," "to see how they got the fine white sugar-crystals from that juice, and I think you'll be surprised when I tell you how it's done. Beth," calling to one of the quiet girls, "tell these people what a precipitate does. Mr. Kent had a big time getting the idea through my head."

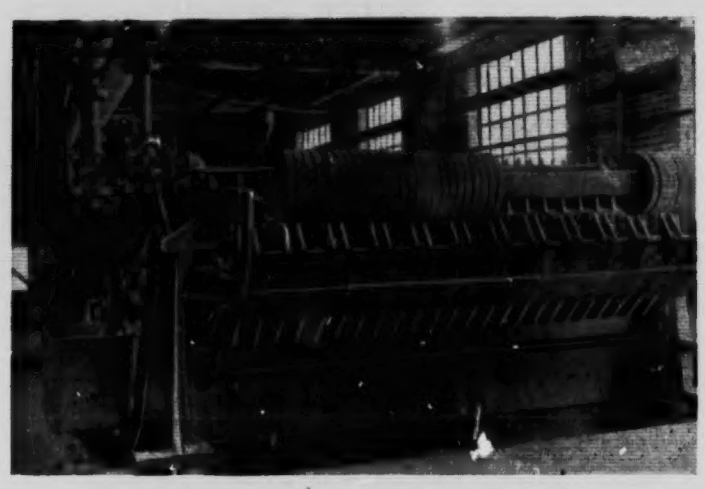
"Well, anyway," the story proceeded after an elementary lesson in chemistry, "the juice is carried from the measuring tanks to huge steel stir ring tanks, and here milk of lime, made also in a special plant in the factory, is added. This causes the substances which prevent crystalization to be precipitated from the juice in solids which can be filtered out of it and then the lime is neutralized in what they called carbonation tanks by blowing carbon-dioxide gas through the juice. Beth can tell you how all this works out chemically; I can't.

"Next we saw the filters, and here one of the most important processes in the whole business was gone through. You see they have to get rid of those solids which have no place in the sugar. [illegible] the juice is run through a series [illegible] filters where it is forced through heavy-weight, closely-woven cotton cloths. The juice comes out clearer and whiter, but this process is repeated several times, more lime and carbon-dioxide gas being introduced each time. Finally, too, a sulphurous gas is passed through it to set free the lime salts.

"Of course," Carol explained, "you can't see these chemical changes going on. They're all done in tanks and pipes and in the various machines. Why, the beets aren't touched by hand at all after they are unloaded, and after the cosettes are placed in the diffusion batteries the juice isn't even exposed to air and so is kept absolutely pure until it becomes sugar.

"So nearly as I could see it from what Mr. Kent told me, the rest of the process was a good deal like the way the farmers make maple syrup from sap—one of boiling down, though, of course, it was done in a different way. The "purified thin juice," as they call it, was pumped up to a big supply tank on the second floor of the factory and from here ran down into evaporators. The boiling-down process is done in a vacuum, though, instead of being open to the air, to prevent the juice going into caramel. As the juice gets thicker it shows traces of the lime previously introduced, and this has to be all taken out. This is done by again passing sulphur gas through it and also by passing the syrup mixture through a series of sand filters, machines, I remember, that looked like huge funnels standing on the floor. My, how that syrup did travel round. There must have been miles

**Rows of "Diffusion" Batteries.**



**One of the "First Carbonation Filters."**

and miles of big pipes in that factory. After leaving the sand filters it was pumped again up to the fourth, or what they called the pan floor, and here in huge vacuum pans, as they called them, though they looked to me like huge short smokestands sat on end with a lot of pipes connected in and out of them, the juice was boiled down further into the sugar crystals.

"Just to give you an idea how much is put through that factory," Carol went on, "it may be worth telling that in one charging of each of those pans enough syrup is boiled to make three hundred barrels, or about forty-five tons of refined sugar. It was interesting to me, too, to find out that the size of the sugar crystal was controlled here, and that they could make it coarse, medium, or fine just by varying the conditions of boiling.

"Up to this time, of course, the sugar, while pure, was light brown in color. I had thought they added some chemical to take out the color. But how do you suppose they do it? Why," when none of the girls would hazard a guess, "they really throw it out. You see, while the greater part of the mass has been boiled into crystals

**"Vacuum Pan," where the Boiling Down Takes Place.**

there still remains a good deal of syrup which surrounds and sticks to them. This mass is led into a battery of 'centrifugals'—really huge cylinders inside each of which is a revolving drum, or basket, with a wire screen inside this again. This screen is so fine that the sugar crystals cannot pass through it, but when the basket is driven round rapidly—my, how it does spin!—the centrifugal motion forces the syrup through the holes in the screen and leaves the crystals deposited on it. Since these crystals are white it begins for the first time to look like the real sugar we put on our oatmeal in the morning.

"What sems like a laundry process follows this, for the sugar crystals are washed and dried, the first washing being done with a sugar syrup so the crystals will not dissolve, the second by a spraying with pure, filtered water."

Here Dorothy, who had been listening eagerly, broke in again. "And I suppose that dirty syrup"—she spoke with a little contemptuous pucker—"is put into cans and that's what we get for breakfast?"

"Well, I just guess not," Carol answered, a little contemptuously. "Wait a minute. That syrup is pumped back to the boiling pans again for a second crystallization, and this process is repeated till all the good sweetening material is gotten out of it.

"Then comes the drying process. From the centrifugals the moist sugar is carried up again to the fourth floor and fed into huge cylindrical drums through which steam-heated air is drawn by fans. The sugar is carried through the drums, the moisture removed by this heated air, and is then raised again to the top of the building to be cooled. The cooler, working a good deal in the same way as the dryer, only using a current of cool air, prevents the sugar caking, which would take place if it were packed while hot.

"You'd think that was enough bother, wouldn't you? But even yet the sugar hasn't reached the state in which it comes to us. From the cooler it passes to a wonderful machine, the separator, which divides it into three distinct grades and provides for the uniform size of the crystals."

"Well," Betty Thomas chimed in here, "you've been telling a pretty good story, Carol, but that's a little too much for me. I don't see how any machine could distinguish between different-sized grains of sugar. Can you believe that, girls?"

"But I tell you it does it," Carol answered, a little warmly and with some extra color in her face. And then, as if by inspiration, "Dorothy, run out and bring in the sugar-bowl, and we'll see."

Close examination revealed to the girls just how uniform the sugar crystals were and after looking them over with a reading glass they were quite ready to concede Carol's point.

"Even the packing," she went on again, after a moment, "was interesting. The 'finished' sugar was carried into a big bin and from this in small spouts to the packing machine. Here the exact amount was weighed into the bags, and these were then transferred

One of the "Dryers"

to a huge sewing-machine which ran a strong seam across the top. The barrels were filled in just about the same way. The nicest part about it all to me was that all this was done without any hands touching the sugar."

"The nicest part to me," Beth commented, when Carol was through, "is the fact that it's all Canadian, right from the time it comes out of the ground till it goes into our tea and"—mischievously—"into us. And I'm so glad you've told us about this part of it. I wish we could buy more things we knew were all made in Canada."

Note.—The factory which Carol (presumably) visited and whose machinery is described is that of the Dominion Sugar Company at Chatham, Ont.

**A Battery of Centrifugal Machines.**

The description of the making of Sugar from Beets, contained herein was written by Edward Moore, and published in "Pleasant Hours" July 19, 1919.

So comprehensive and entertaining is the story, that we gained permission to have it reprinted in pamphlet form.

**DOMINION SUGAR COMPANY**
**CHATHAM, ONTARIO**